

5 CLAIMS

We Claim:

1. A high throughput method to determine an amount of a comonomer in a copolymer sample, the method comprising the steps of:
 - a) providing a plurality of copolymer samples;
 - 10 b) creating an array of the copolymer samples;
 - c) measuring a sample complex modulus of each of the copolymer samples at a comparison phase angle;
 - d) determining the amount of a comonomer in the copolymer sample by comparing the sample complex modulus to a calibration curve,
 - 15 wherein the calibration curve relates a concentration of the comonomer in the copolymer sample to a complex moduli of the copolymer sample determined at the comparison phase angle.
2. The method of claim 1, wherein the step of providing a plurality of copolymer samples comprises providing a plurality of copolymers comprising ethylene, propylene, or both ethylene and propylene.
- 20 3. The method of claim 1, wherein the copolymer samples comprise a C₄ to C₄₀ alpha olefin.
4. The method of claim 1, wherein the comparison phase angle is about 5 to about 85°.
- 30 5. The method of claim 1, wherein the comparison phase angle is about 20 to about 60°.
6. The method of claim 1, wherein the comparison phase angle is about 30 to about 40°.

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5 7. The method of claim 1, wherein two or more of the sample complex moduli are measured simultaneously.

8. The method of claim 1, wherein the creating an array of the copolymer samples step includes extruding a copolymer sample in a molten state, followed by pressing and forming the copolymer sample into a flat disk.

9. The method of claim 1, wherein the creating an array of the copolymer samples step includes combining a copolymer sample with a solvent, depositing at least a portion of the combined copolymer sample and the solvent on a surface, removing at least a portion of the solvent, followed by pressing and forming the copolymer sample into a flat disk.

10. A high throughput method to determine an amount of a comonomer in a copolymer sample, the method comprising the steps of:

- a) providing a plurality of copolymer samples;
- b) creating an array of the copolymer samples;
- c) measuring a sample crossover modulus of each of the copolymer samples at a comparison phase angle;
- d) determining the amount of a comonomer in the copolymer sample by comparing the sample crossover modulus to a calibration curve, wherein the calibration curve relates a concentration of the comonomer in the copolymer sample to a crossover moduli of the copolymer sample determined at the comparison phase angle.

11. The method of claim 10, wherein the step of providing a plurality of copolymer samples comprises providing a plurality of copolymers comprising ethylene, propylene, or both ethylene and propylene.

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5 12. The method of claim 10, wherein the copolymer samples
comprise a C₄ to C₄₀ alpha olefin.

 13. The method of claim 10, wherein the comparison phase
angle is about 5 to about 85°.

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 14. The method of claim 10, wherein the comparison phase
angle is about 20 to about 60°.

 15. The method of claim 10, wherein the comparison phase
15 angle is about 30 to about 40°.

 16. The method of claim 10, wherein two or more of the sample
crossover moduli are measured simultaneously.

20 17. The method of claim 10, wherein the creating an array of the
copolymer samples step includes extruding a copolymer sample in a
molten state, followed by pressing and forming the copolymer sample into
a flat disk.

25 18. The method of claim 10, wherein the creating an array of the
copolymer samples step includes combining a copolymer sample with a
solvent, depositing at least a portion of the combined copolymer sample
and the solvent on a surface, removing at least a portion of the solvent,
followed by pressing and forming the copolymer sample into a flat disk.

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 19. A method to determine an amount of a comonomer in a
copolymer sample, the method comprising the steps of:

 a) providing a copolymer sample;

 b) measuring a sample crossover modulus of the copolymer
35 sample at a comparison phase angle;

5 c) determining the amount of a comonomer in the copolymer sample by comparing the sample crossover modulus to a calibration curve, wherein the calibration curve relates a concentration of the comonomer in the copolymer sample to a crossover moduli of the copolymer sample determined at the comparison phase angle.

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20. The method of claim 19, wherein the copolymer sample comprises ethylene, propylene, or both ethylene and propylene.

21. The method of claim 19, wherein the copolymer sample
15 comprise a C₄ to C₄₀ alpha olefin.

22. The method of claim 19, wherein the comparison phase angle is about 5 to about 85°.

20 23. The method of claim 19, wherein the comparison phase angle is about 20 to about 60°.

24. The method of claim 19, wherein the comparison phase angle is about 30 to about 40°.

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25. The method of claim 19, wherein the providing a copolymer sample step includes extruding the copolymer sample in a molten state, followed by pressing and forming the copolymer sample into a flat disk.

30 26. The method of claim 19, wherein the providing a copolymer sample step includes combining a copolymer sample with a solvent, depositing at least a portion of the combined copolymer sample and the solvent on a surface, removing at least a portion of the solvent, followed by pressing and forming the copolymer sample into a flat disk.

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